



AAR-100

Human Factors Newsletter # 04-01

December 27, 2003 – January 9, 2004

Research Grant Report: *Proposal to Support Development of a Research Framework for Controller En Route Evolution Procedures.* Kevin Coker, Ph.D., San Jose State University

Purpose: The work is directed to linking a human performance model (Air MIDAS) to the RAMS airspace representation system developed under EUROCONTROL and FAA funding. Use of fast time simulations that include human performance characteristics is critical to the evaluation of new operational concepts on a large scale. In particular, the research is directed to assessing the impact of large-scale airspace management on controllers. In this study, the number of aircraft and the complexity of traffic are evaluated in high altitude airspace the size of a center versus standard sector dimensions. The independent variables in this study are the number of controllers in an assigned airspace and the traffic densities they are required to control. Secondary independent variables are the separation standards being maintained in that airspace. The effective integration of a fast-time human performance and airspace model provides a new tool for both detailed human impact and large-scale airspace evaluation.

Methodology: The study was undertaken by linking two independent simulation engines in a coordinated simulation. The airspace simulator (RAMS) is an event-based simulation, moving between defined events to generate airspace performance data. The Air MIDAS model is a time-based detailed model of human perception and cognition. The models are linked through an interface protocol that coordinates the disparate simulation techniques. The analysis is being conducted to determine the task load, communication load, and decision processes that are undertaken by controllers of a large-scale (center-sized) high altitude airspace. The impact of that controlled traffic is then explored at a national airspace level in the continued operation of the RAMS simulator. The number of aircraft per controller, the complexity of their trajectories, and the conditions of their spacing are the independent variables in this study. The controller performance loads (or overloads) and the quality of their control are the dependent variables evaluated by Air MIDAS.

Results: The results are associated with the complexity of linking different airspace models. The analytic simulations enabled by this linkage have not yet been run. Two issues had to be resolved in order to integrate a human performance model. First, the event-based control of the

RAMS simulation makes it discontinuous in time, while the Air MIDAS simulation is a time-based simulation. The two simulation control styles were reconciled by development of a common data representation of the controlled world that could be accessed by each simulation in its own control mode. The second development was the piecewise inhibition of the RAMS control mechanisms of the RAMS standard simulation to allow for Air MIDAS control commands. Both of these simulation developments have been completed, and the designs developed are likely able to be used in other dissimilar simulation integrations.

The significant accomplishment in FY2003 was development of a fully linked large-scale airspace simulation with detailed human performance models coordinating with portions of the full airspace. The result of this development provides a rapidly reconfigurable simulation system to evaluate the effect of procedural and technical changes in the airspace. The detailed human performance model in this simulation supports the causal analysis of the impact of developments. The work provides the platform for the large-scale airspace analysis.

Point of Contact: D. Piccione, AAR-100

Note: For more information on this and other research projects, go to:
<http://www.hf.faa.gov/report.htm>

Human Factors Research Projects Database Now Online: To access the database, go to:
<http://www.hf.faa.gov/hfmap/>

The objective of the human factors research projects database is to educate federal research program managers and researchers on human factors projects that were funded by the Federal Aviation Administration, Office of Naval Research, Air Force Office of Scientific Research, Army Research Laboratory Human Engineering and Research Directorate, National Aeronautics and Space Administration, Army Research Institute, National Science Foundation, and National Institutes of Health during FY 2003. This exclusive database is project specific, allowing users to search by principle investigator, principle investigator's institute, funding organization, state, and key words. The stipulation for inclusion into the database was FY 2003 funded projects; however most of these projects are multiple year efforts that span pre- and post FY 2003. Accordingly, the user can gain valuable insight in understanding what may be funded in the near future.

This unique database allows users to understand what was funded by each organization at the project level (contract or grant awarded to a principle investigator). Popular databases such as the Defense Technical Information Center roll-up each funding organization's projects into a high level program description that reduces the level of detail about each project. Although the database is not a complete list of all federally funded human factors projects, it does represent a large percentage of the federal human factors basic research and development program.

A potential application of the database may allow program managers to search for projects that are similar to a proposed new start research requirement. By searching the database, the program manager may find a similar project that could leverage another funding organization's project. Perhaps the two funding organizations could form a collaborative agreement to achieve each research goals while saving resources. (W. Krebs, AAR-100)

Statistical Data Analysis: Technical Center researchers Kenneth Allendoerfer, Ferne Friedman-Berg, and Ben Willems made a presentation to the local chapter of the human factors society regarding methods of presenting data to audiences whose members do not have a statistical background. Human factors practitioners are often faced with small sample sizes in applied research. The chapter panel will now discuss statistical issues that arise from this limitation, and best practices when dealing with the data. Examples of topics discussed were as follows:

- Presenting statistical data to audiences who are not statistically sophisticated
- Explaining the relationship between sample size and power

Point of Contact: E. Stein, WJHTC

NATPRO: Julia Pounds/CAMI was in Raleigh, NC the week of December 22, 2003 to confer with Mr. Randy Breedlove, National Air Traffic Professionalism (NATPRO) Program Manager, and other members of the NATPRO deployment team. Team members reviewed the Practicum software suite and assessed issues of website implementation. Plans and materials were finalized for the NATPRO Coaches Clinic scheduled to be conducted in January 2004. This effort supports Flight Plan Safety Initiative research involving performance enhancement-based training. (J. Pounds, CAMI)

Operational Errors: Julia Pounds also attended training to use the Starlight Information Visualization System. The system was developed by the Pacific Northwest National Laboratory for DOD and DOE as a tool for integrating and interpreting complex data formats. An assessment will be made to determine whether Starlight will enhance information extracted from archival operational error data. This effort supports Flight Plan Safety Initiative research to understand the causes of operational errors and to facilitate development of appropriate training. (J. Pounds, CAMI)

Enhanced Traffic Management System (ETMS):

- Tanya Yuditsky traveled to the Volpe National Transportation Systems Center to participate in a discussion about Traffic Situation Display design. The main focus of the meeting was a modeling function that allows Traffic Management Specialists to evaluate the impacts of a planned reroute. Together with a software engineer from Volpe, she presented several alternatives for displaying the results of a modeled reroute. Both researchers also led a discussion with representatives from the field about what information specialists need to decide whether to proceed with the reroute as planned. (E. Stein, WJHTC)
- Tanya Yudiitsky also supported a demonstration of Version 7.8 of the ETMS. After a brief overview of the new features and functions, participants from the field exercised the system. During the demonstration, she observed their interactions with the system and noted any difficulties they encountered. The participants identified several software bugs that will be corrected, but overall, the new functions worked as designed. The two significant changes in this release are a redesign of the Create Reroute function and Dynamic Sectorization. The Create Reroute function was redesigned to provide a more

intuitive user interface with increased functionality. Dynamic Sectorization is a new capability that provides the ETMS with current sector configurations. Previously, the system was not able to display traffic counts or sector overlays for combined sectors. A team of user representatives, human factors specialists, and software engineers developed the designs for these functions. (E. Stein, WJHTC)

ATEAM: Members of the research group from ACB-220 briefed the Air Traffic Terminal Enhancement and Modernization team (ATEAM) on current projects pertaining to advanced ATC weather products. The briefing included topics on weather information needs, weather displays, display alternatives, and results from previous research on the effects of adverse weather phenomena on controller and pilot operations. The researchers from ACB-220 also had an opportunity to demonstrate an early prototype of advanced weather products for auxiliary displays. This prototype is under development and will be used during an upcoming human-in-the-loop simulation that will investigate the effects and benefits of advanced weather products on terminal air traffic control. (U. Ahlstrom, WJHTC)

More information on human factors research can be found at the FAA Human Factors (AAR-100) web site: <http://www.hf.faa.gov>

Mark D. Rodgers
FAA (AAR-100)



January 11-15, 2004 – Transportation Research Board Annual Meeting, Washington, DC
<http://www4.trb.org/trb/annual.nsf>

January 13-15, 2004 – SAE SEAT –Aircraft Seat Committee Meeting, Phoenix, AZ
mlemank@sae.org

January 13-16, 2004 – International Conference on Intelligent User Interfaces/Computer-Aided Design of User Interfaces, Island of Madeira, Portugal <http://www.iuiconf.org/>

January 18-22, 2004 – Conference on Visualization and Data Analysis, San Jose Marriott and San Jose Convention Center, San Jose, CA <http://vw.indiana.edu/vda2004/>

January 21 – 23, 2004 - AHS 4th Decennial Specialists' Meeting on Aeromechanics, Fisherman's Wharf, San Francisco, CA. For more information contact the Technical Chairman, Tom Maier at tmaier@mail.acr.nasa.gov

February 9, 2004 – Call for proposals (workshops, lecture papers, symposia, panels, debates, special-format sessions, and posters), Human Factors and Ergonomics Society 48th Annual Meeting to be held September 20-24, 2004, New Orleans, LA
<http://www.hfes.org/meetings/2004menu.html>

March 2-3, 2004 – REDAC Human Factors Subcommittee, Washington, DC
<http://research.faa.gov/aar/redac.asp>

March 3-4, 2004 – 5th European Technology Summit, Amsterdam Marriott Hotel, The Netherlands <http://www.eyefortransport.com/technology/brochure.shtml>

March 4-5, 2004 - Divisions 19 and 21, in conjunction with the Potomac Chapter of the Human Factors and Ergonomics Society, will be hosting the Annual Mid-year Symposium March 4th and 5th, 2004 at the Fort Belvoir Officer's Club, Fort Belvoir, Virginia. jruffner@dcscorp.com

March 8-11, 2004 – SAE World Congress, Cobo Hall, Detroit, MI
<http://www.sae.org/congress/index.htm>

March 15-17, 2004 – 16th Annual European Aviation Safety Seminar, Barcelona, Spain
http://www.flightsafety.org/eass04_cfp.html

March 22-24, 2004 – Eye Tracking Research and Applications Symposium, Menger Hotel, San Antonio, TX <http://www.e-t-r-a.org/>

March 22-25, 2004 – HPSAA II Conference, Human Performance, Situation Awareness, and Automation Technology, hosted by Embry-Riddle Aeronautical University and the University of Central Florida, Hilton Oceanfront Resort, Daytona Beach, FL
<http://faculty.erau.edu/vincenzd/hpsaa>

March 23-26, 2004 – 4th International Workshop on Smart Appliances and Wearable Computers, Tokyo, Japan <http://www.unl.im.dendai.ac.jp/IWSAWC/>

April 2004 – DOD TAG-51, Atlantic City, NJ <http://hfetag.dtic.mil/meetschl.html>

April, 2004 – SAE General Aviation Technology Conference and Exhibition, Century II Convention Center, Wichita, KS <http://www.sae.org/calendar/aeromtgs.htm>

April 18-21, 2004 – FAA Worldwide Airport Technology Transfer Conference, Hilton Atlantic City Hotel, Atlantic City, NJ <http://www.airtech.tc.faa.gov/att04/>

April 20-22, 2004 – SAE General Aviation Technology Conference and Exhibition, Century 21 Convention Center, Wichita, KS <http://www.sae.org/calendar/aeromtgs.htm>

April 24-29, 2004 – CHI 2004, Conference on Human Factors in Computing Systems, Vienna, Austria <http://www.acm.org/sigchi/chi2004/>

April 25-28, 2004 – SAE Cabin Safety Technical Committee Meeting, Oklahoma City, OK
mlemank@sae.org

April 27-29, 2004 – 49th Annual Corporate Aviation Safety Seminar, Tucson, AZ
http://www.flightsafety.org/cass04_cfp.html

May 3-6, 2004 – SAE Aircraft Oxygen Equipment Committee, Anchorage, AK
mlemank@sae.org

May 3-6, 2004 – 75th Annual Scientific Meeting of the Aerospace Medical Association, Egan Convention Center, Anchorage, AK <http://www.asma.org/>

May 6-8, 2004 - AHS International 60th Annual Forum and Technology Display, Virginia Beach, VA. Contact Staff@vtol.org

May 10-12, 2004 – Royal Aeronautical Society 10th AIAA CEAS Aeroacoustics Conference, Manchester Town Hall, UK <http://www.aerosociety.com/homepage.asp>

May 11-13, 2004 – SAE SEAT – Aircraft Seat Committee, Savannah, GA
mlemank@sae.org

May 23-26, 2004 – Tenth International Conference on Mobility and Transport for Elderly and Disabled People, Hamamatsu, Japan <http://trb.org/calendar/>

May 26-27, 2004 – Royal Aeronautical Society Conference – Flight Simulation 1929-2029, A Centennial Perspective, London, UK <http://www.aerosociety.com/homepage.asp>

June 15-17, 2004 – SAE Digital Human Modeling for Design and Engineering Meeting, Oakland University, Rochester, Michigan <http://www.sae.org/calendar/aeromtgs.htm>

July 27-August 2, 2004 – 52nd Annual AirVenture, Oshkosh, WI <http://airventure.org/>

July 28 – August 1, 2004 – 112th Convention of the American Psychological Association. Honolulu, Hawaii <http://www.apa.org/convention>

August 1-4, 2004 – Designing Interactive Systems, Cambridge, MA
<http://www.sigchi.org/DIS2004/>

September 8-9, 2004 – Civil Aviation Safety Symposium 2004, Westin Hotel Galleria, Dallas, TX
<http://www.asdnet.org/cass/default.htm>

September 20-24, 2004 – Human Factors and Ergonomics Society 48th Annual Meeting, Sheraton New Orleans Hotel, New Orleans, LA <http://www.hfes.org/>

September 29 – October 1, 2004 – 2004 International Conference on Human Computer Interaction (HCI-Aero), Toulouse, France
<http://www.eurisco-international.com/hci-aero2004>.

October, 2004 – 18th Airbus/JetBlue Human Factors Symposium, New York City, NY
<http://www.airbus.com/customer/events.asp>

October 4-7, 2004 – SAE SEAT – Aircraft Seat Committee Meeting, Albuquerque, NM
mlemank@sae.org

October 18-19, 2004 – National Academies Institute of Medicine Annual Meeting, National Academy of Sciences, Washington, DC <http://wwwsearch.nationalacademies.org/>

October 23-27, 2004 – NordiCHI 2004, Tampere, Finland <http://www.cs.uta.fi/nordichi2004/>

October 25-28, 2004 – SAE S-9 Cabin Safety Technical Committee Meeting, San Diego, CA
mlemank@sae.org

October 25-28, 2004 – DoD Maintenance Seminar and Exhibition, Hilton Americas, Houston, TX <http://www.sae.org/calendar/aeromtg.htm>

January 9-13, 2005 – TRB 84th Annual Meeting, Washington, DC <http://trb.org/calendar/>

April 11-15, 2005 – SAE 100th Anniversary World Congress, Cobo Hall, Detroit, MI
<http://www.sae.org/congress/about/news/congressdates.htm>

May 9-12, 2005 - 76th Annual Scientific Meeting of the Aerospace Medical Association, Kansas City, MO <http://www.asma.org/>

August 18-21, 2005 - 113th Convention of the American Psychological Association, Wash, DC
<http://www.apa.org/convention>

September 26-30, 2005 – Human Factors and Ergonomics Society 49th Annual Meeting, Royal Pacific Resort at Universal Orlando, Orlando, FL <http://hfes.org/meetings/menu.html>

October 24-25, 2005 – National Academies Institute of Medicine Annual Meeting, National Academy of Sciences, Washington, DC <http://wwwsearch.nationalacademies.org/>

January 22-26, 2006 – TRB 85th Annual Meeting, Washington, DC <http://trb.org/calendar/>

Note: Calendar events in Italics are new since the last Newsletter



Comments or questions regarding this newsletter?
Please contact Bill Berger at (334) 271-2928
or via e-mail at [bill.ctr.berger @faa.gov](mailto:bill.ctr.berger@faa.gov)